MOD21 high AOD (dust) contamination QC and error analysis

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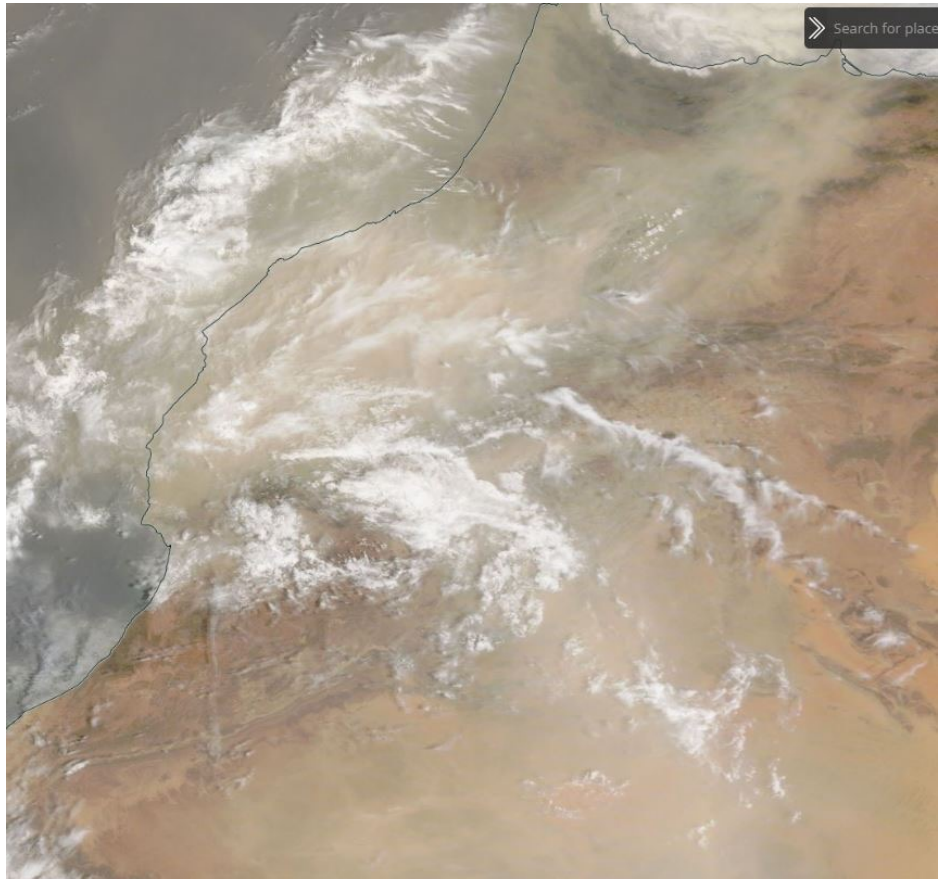
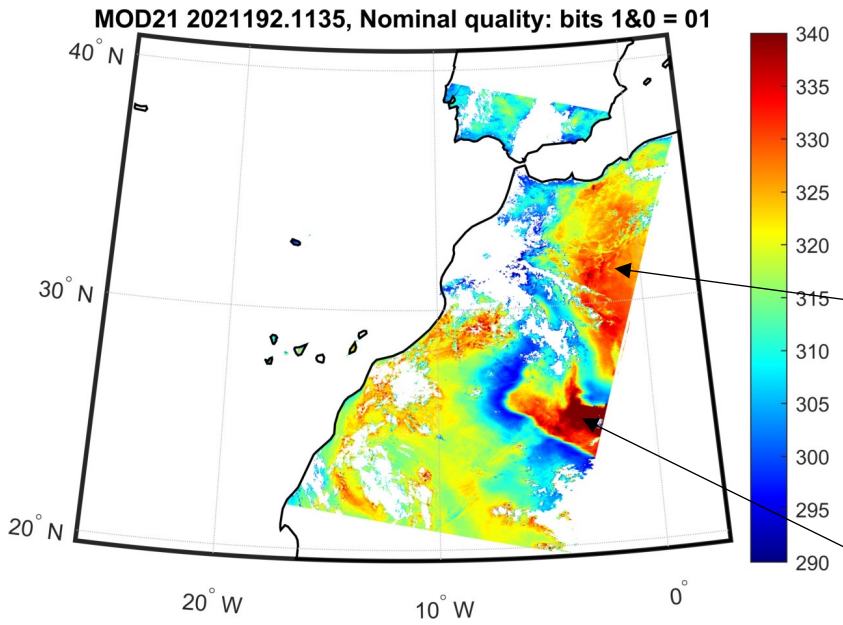
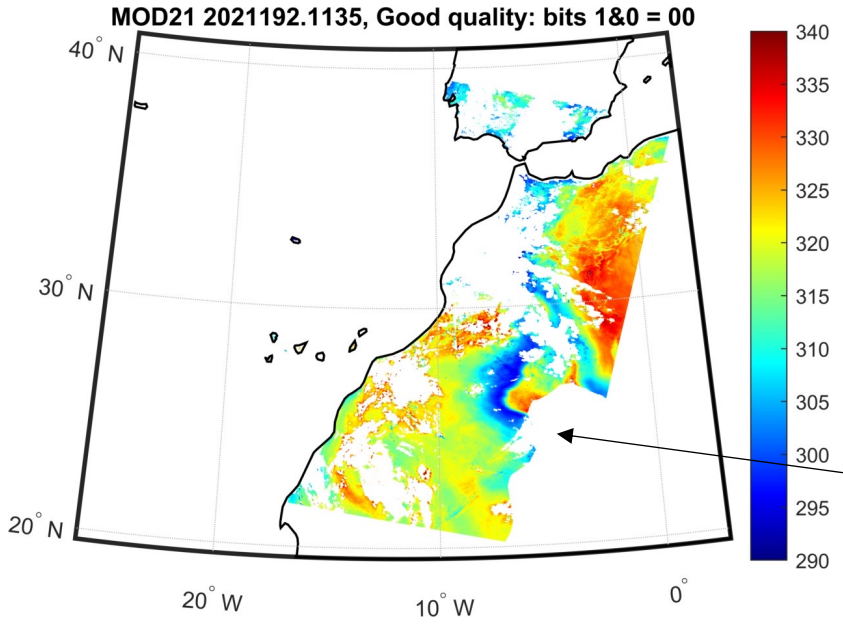


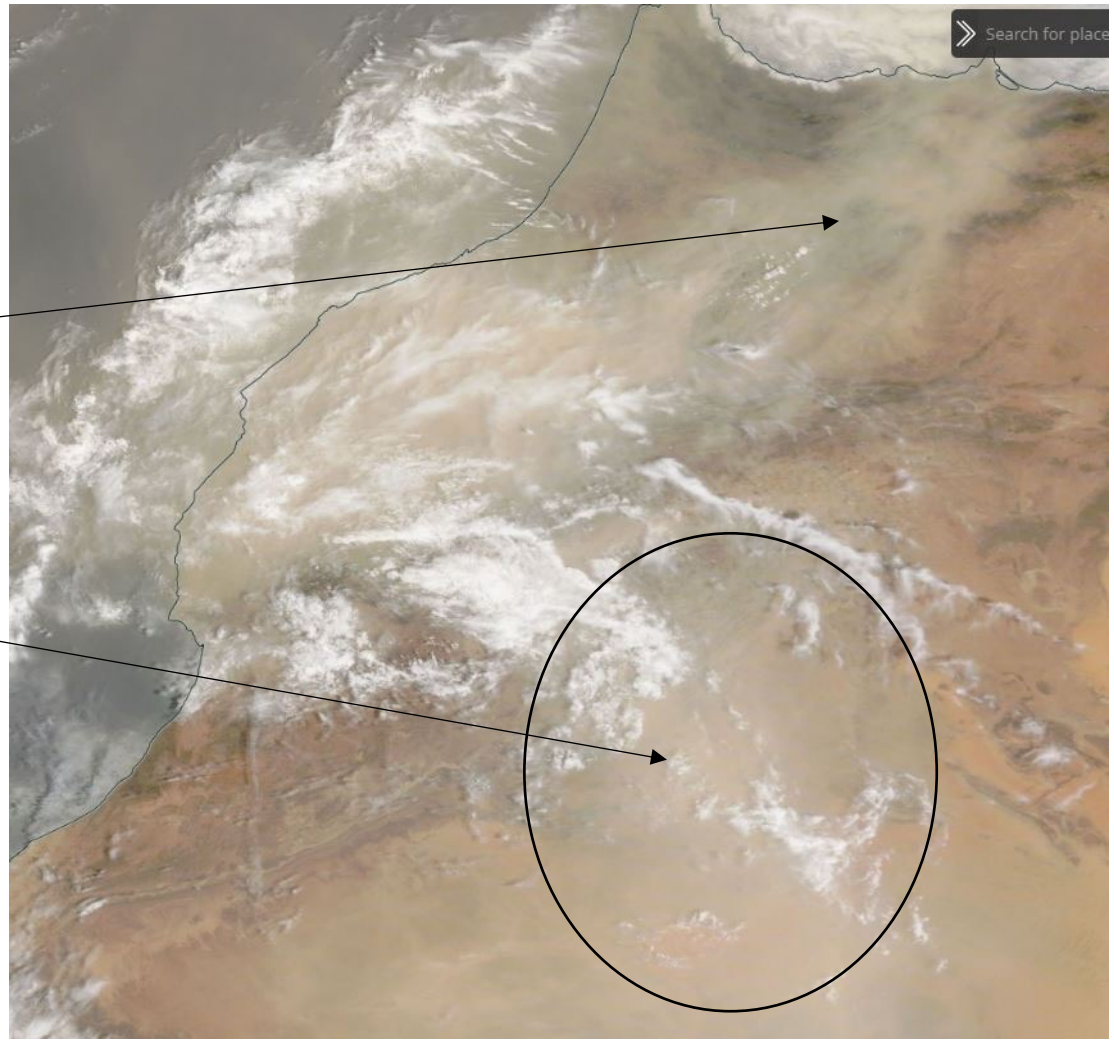
Example: MOD21.A2021192.1135.061 LST





Dust

Dust



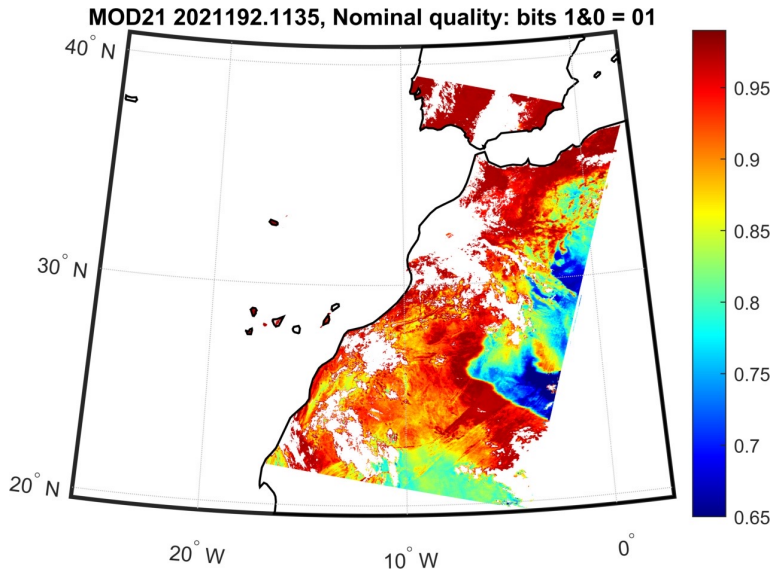
Mostly removed when using good quality bits only – please see user guide for details

Example: MOD21.A2021192.1135.061 Emissivity

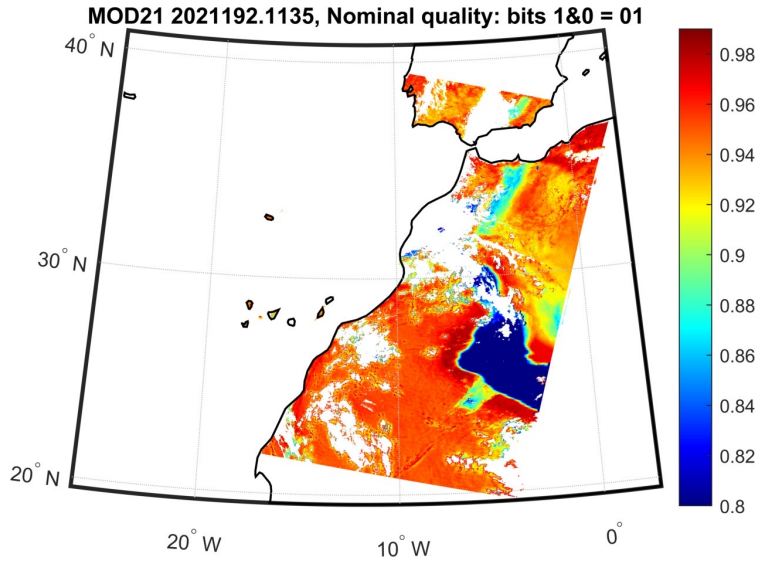
We see lower emissivities in all bands over the high AOD dust region. This results in overestimated LST over those areas.

We could threshold values of band 32 emissivity to remove dust in this case (see next slide). Usually band 32 emissivities should be >0.96 for most surfaces, except volcanic regions where maffic rocks have emissivities in this band <0.96 (which is why we can't set a threshold to flag these values as bad, globally). As a compromise we flag suspect pixels in QC with both band 31 and 32 <0.95, but that doesn't always remove all dust and cloud contamination (see user guide).

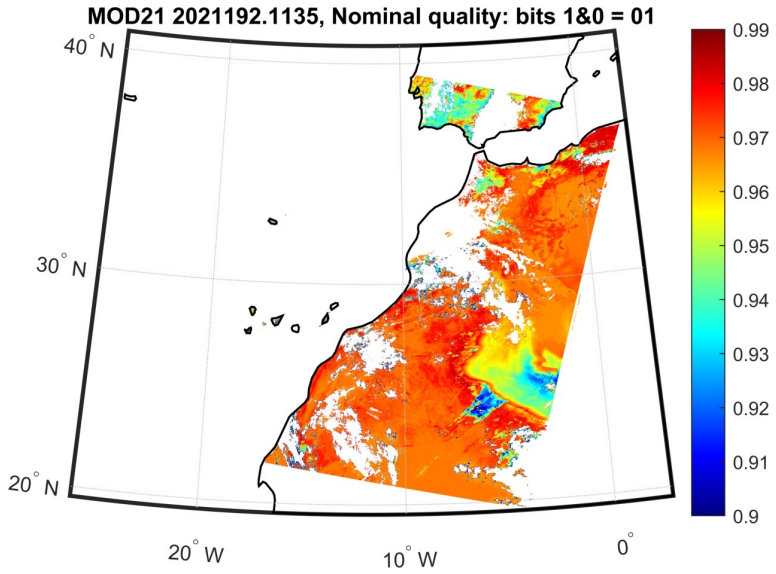
Band 29



Band 31

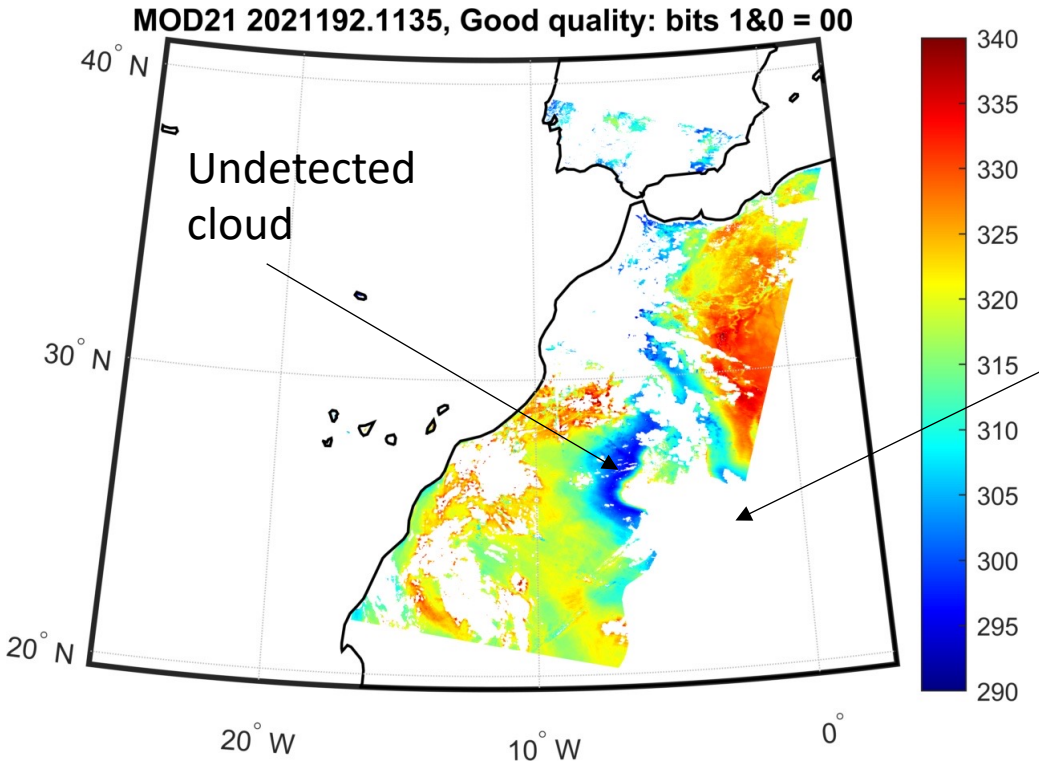


Band 32

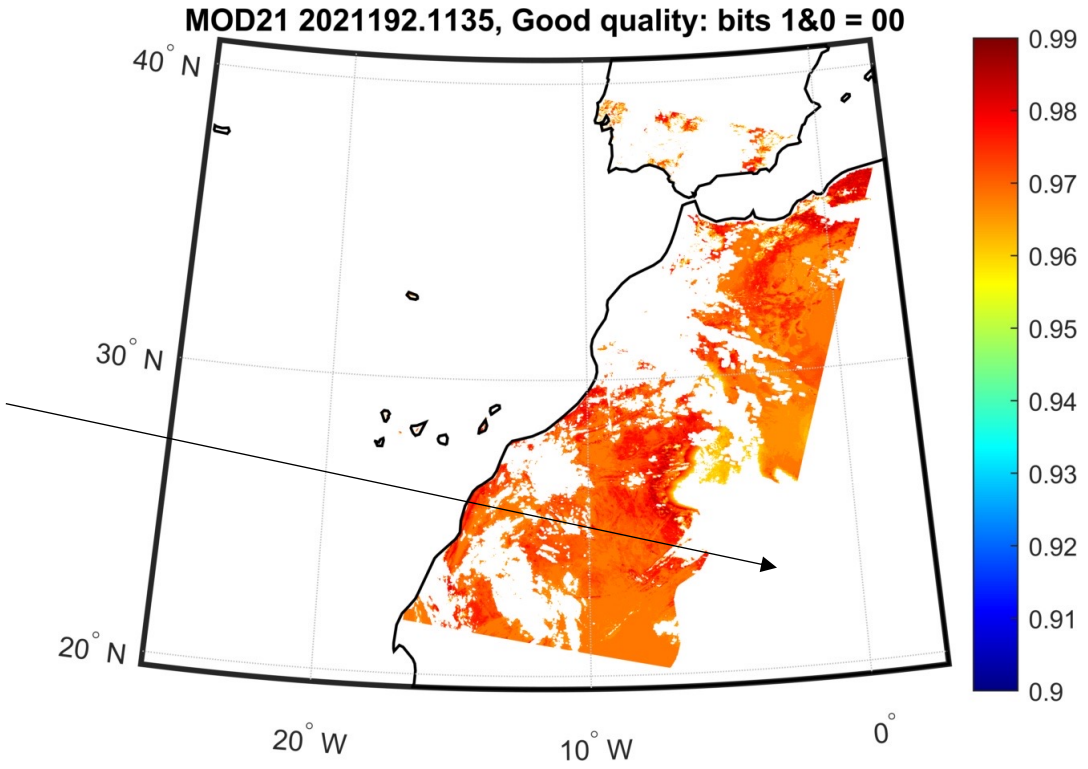


Using Good quality QC and band 32 emissivity to remove dust:

Using only good quality QC pixels, and using the band 32 filter removes most dust contamination, although some undetected cloud artifacts remain. Cloud detection over desert is challenging due to reflective ground surfaces, and warmer clouds in general (see MOD35 ATBD for more details).



Most dust-contaminated pixels removed



Using LST estimated error (LST_err) to remove bad pixels:

Using nominal threshold of flagging bad pixels with LSTerr>2.5 K